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Method and arrangement in a telecommunication system

FIELD OF THE INVENTION

The present invention relates to methods and arrangements in
 5 a mobile 3rd generation communication system and user
 equipments intended for usage in such systems. It relates in
 particular to situations when certain services, e.g. related
 to emergency calls, in the UTRAN are not available while the
 user equipment could perform this service also over a backup
 10 network, e.g. a GSM-network, which it can access.

SUMMARY OF THE INVENTION

The present invention relates to the radio network part
 (UTRAN) of a 3rd generation communication system, e.g. a
 15 WCDMA-system, to which the following will refer to as an
 example, and addresses in particular problems that may arise
 when certain services, which the network is supposed to
 offer, are unavailable, e.g. due to faults in one of the
 units or links of said communication system or due to
 20 temporary congestions in said communication system.

Present 3rd generation communication systems, as standardised
 by the 3rd Generation Partnership Project (3GPP), do not
 fully support to use another communication system, e.g. a
 GSM-system, as a backup system for services that are
 25 temporarily unavailable. Instead, a user equipment must stay
 in said communication system, which it is presently
 associated to, although a required service is presently not
 available or the user equipment is forced to move entirely
 to the backup communication system, although certain

services that are needed by the user equipment would still be available in the disturbed system.

It is therefore an object of the present invention to increase the availability of services to user equipments even if the UTRAN temporarily does not work properly with regard to a certain service. Within the scope of the present invention, services relate to such services that can be performed typically in the UTRAN and the backup communication system. One important example of such services relates, e.g., to emergency calls; however, the invention is notwithstanding applicable for other kinds of services.

This and other objects of the present invention are achieved by a communication system and a user equipment that are capable of providing the following features:

1) An appropriate network unit within the communication system comprising means to inform user equipments that are served by said system about UTRAN services that are not available and, optionally, additional information that may indicate, e.g., a reason for said unavailability or an estimated time interval within which a service is unavailable. Another alternative would be that the network instead indicates the still available alternatives in case of a network fault. More generally, the UTRAN comprises an appropriate status information with regard to the availability of at least a certain range of services.

2) The network being capable to re-direct a user equipment to a backup network, e.g. a GSM-network, in cases where a needed service in the UTRAN is not available; however, the network also provides the possibility to continue the usage of services in UTRAN that are still available even if the user equipment intends to apply for a temporarily

unavailable service, which the UTRAN can instead arrange to be provided by the backup network.

3) A user equipment comprising means to indicate to the network the priority of new requested services.

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DETAILED DESCRIPTION

According to a first aspect of the present invention the communication system comprises means to inform user equipments that are served by said system about the availability of UTRAN services. This network means is capable to inform the user equipment about services, or at least a certain range of services, that are not available or inform it about available alternatives for the use of a certain requested service. This can be realised by means of including such availability information in an appropriate information message that is sent within certain time periods, e.g. the system information that is updated periodically and sent to the user equipment. The information element transmitted in such a message should be such that all user equipments are requested to read this information when the system information is updated. This could be achieved by applying mechanisms that are currently specified in the Technical Specification document 3GPP TS25.331 "RRC Protocol Specifications" where a system information block is repeatedly sent on the BCCH with a certain periodicity. For instance, a system information block type 1, which currently contains core network related information, could also include indications about service availability. When the system information carrying the indications are updated a Paging type 1 message is sent to all user equipments in the cell with an information about the updated BCCH, which is also specified in said document 3GPP TS25.331. The user equipment comprises the necessary means to perform a switch

- to the backup network immediately if a service that is requested by the user equipment is indicated to be unavailable. This method implies the advantage that the system information covers all idle user equipments and user equipments on common channels. Alternatively, it would be possible to include availability information in a dedicated message, e.g. in the UTRAN mobility information, and send this information to the user equipments on dedicated channels whenever the information changes.
- 10 In a conceivable embodiment of the present invention, the user equipment comprises means to inform the user about the unavailable service, either immediately or as soon as the user takes any actions to request an unavailable service. By that the user is able to choose the appropriate priority level for a requested service.

The following describes an example of the above mentioned functionality of the network and user equipment: When assuming that the Iu-link towards a circuit-switched core network is interrupted, while the corresponding Iu-link towards the packet-switched core network works as usual, a user equipment that is about to make an emergency call is informed and can realise that the circuit-switched services are not available and instead set up a call over the backup network. Then, the same user equipment when downloading packet data can continue to use the packet-switched core network part as usual on the original network or transfer also the packet-switched core network part to the backup network.

The network is capable to re-direct a user equipment to a backup network in cases where a needed service in the UTRAN is not available. There could be several reasons that services are not available: Link interruption, e.g. an Iu-link break, various congestion situations in the

communication system, or resource shortages, e.g. for a call setup. This is true both when the user equipment already applies a certain service that suddenly becomes unavailable or when the user equipment requests for a new service.

5 Therefore, the communication system comprises means that enable the user equipment to use those services that are still available and re-direct the user equipment to the backup network if the requested service is not available in UTRAN.

10 In order to always be able to re-direct a user equipment from UTRAN to, e.g. a GSM-network, a re-direction retry indication must be included both in the RRC Connection Setup Reject message, as provided for in the Technical Specification document 3GPP TS25.331, issued by the 3GPP,

15 and also included in the RRC Connection Release message.

It is essential that the re-direction retry indication is included in said RRC Connection Release as it is otherwise not possible to re-direct the user equipment, e.g., to the GSM-network until said user equipment makes a new access

20 from its idle state. This becomes apparent from the following: If the user equipment already has a connection towards a core network domain, a new request will be made with an already established RRC Connection instead of from the idle mode. When the original attempt fails, the user

25 equipment still has an RRC-Connection, it will make a new attempt, which also fails, i.e. the user equipment is locked in UTRAN where the requested service is not available. Moreover, if the current connection is, e.g., towards the packet-switched core network and UTRAN releases said user

30 equipment at an incoming circuit-switched call (without a re-directed retry) it is very likely that the application in the user equipment will connect again to the packet-switched Radio Access Bearer in the UTRAN before the user has the possibility to make a new attempt from Idle towards the

circuit-switched core network potentially through any existing backup network.

The following describes several examples of re-directions of user equipments to a backup network:

- 5 1) A user equipment has an ongoing emergency call when a Iu-link break towards the circuit-switched core network occurs. In this case, the call is to be released and re-directed to the backup network, e.g. the GSM-network. The UTRAN releases the RRC connection by sending a RRC Connection Release
10 message to the user equipment. The RRC Connection Release message includes the re-direct indication to, e.g., the GSM-network so that the user equipment does not retry to connect through UTRAN again where the last connection failed.
- 15 2) A user equipment has an ongoing communication over a packet-switched Radio Access Bearer when there is a Iu-link break towards the circuit-switched core network and the user equipment wants to make an emergency call. In this case, the user equipment shall be released and re-directed to the backup network, e.g. the GSM-network. Also for this case,
20 the UTRAN releases the RRC connection with a RRC Connection Release message including an indication that the user equipment shall try, e.g., the GSM-network instead. Without this indication a normal RRC Connection release would lead to that the user equipment remains to be connected to the
25 UTRAN and will try to establish, e.g., the emergency call service that is currently unavailable once more in this network. This is true especially since the ongoing packet-switched radio access bearer will try to re-establish the connection directly after the RRC connection release to the
30 UTRAN, where the packet-switched services are available.
- 3) A user equipment wants to establish a packet Radio Access Bearer but fails due to a congestion. Then, the user equipment shall be re-directed to the backup network, e.g.

the GSM-network. If the packet-switched Radio Access Bearers are not available in the one network, the circuit-switched Radio Access Bearers can still be used in that network; however, if a user equipment wants to set up a packet connection it could be re-directed to the backup network that would provide the packet-switched Radio Access Bearers, e.g. in this case a GPRS-based network.

When seen from the perspective of the user equipment, the present invention enables the user equipment to inform the UTRAN about the priority of new requested services. In order for the UTRAN to make the right decisions regarding whether a user equipment should be re-directed to a backup network or not it is important that the user has a possibility to inform the UTRAN about the priority of a new requested service and if current services should be released to make sure that the new attempt will work. In order to cover service requests both for the idle user equipments and user equipments that already are connected, the indications for "priority" and "allow to release other services" are both included in the RRC Connection Request, the Initial Direct Transfer, the UL Direct Transfer, and the Cell Update.

This can be explained by help of an example: Assuming a user equipment having an ongoing Radio Access Bearer and requesting a new Radio Access Bearer. The reason why this request fails could be, e.g., a congestion in the transport network or that a service-server is not available. If the user can inform the UTRAN about the priority level of the requested Radio Access Bearer, e.g. a high priority, and that a release of other services is allowed, the UTRAN may release the user equipment using the RRC Connection Release with re-directed retry in order to be able to use the new requested service in a backup network, e.g. GSM or GPRS.

CLAIMS

1. A first communication network providing communication services to one or more user equipments,
 5 c h a r a c t e r i s e d i n
 a network unit, which controls the one or more user equipments, providing means for including an information element within a communication message to said user equipments to indicate the availability status of at least
 10 a range of services that are provided by said first communication network.
2. The network according to claim 1, wherein the network unit comprises means for re-directing a user equipment to a second communication network, which is accessible for the
 15 user equipment, if said user equipment is using a service or intends to use a service that is temporarily not available in said first communication network.
3. The network according to claim 2, wherein a re-direction retry is included both in the RRC Connection Setup Reject
 20 and the RRC Connection Release.
4. A user equipment in a first communication network
 characterised in
 means for retrieving information about the availability status of at least a range of services that are provided by
 25 said first communication network,
 means for indicating to said first communication network the priority of a requested service.
5. The user equipment according to claim 4 whereby the user equipment comprises means for accessing network services,

which have been indicated to be at least temporarily not available in the first communication network, by using the facilities of a second communication network while continuing accessing other network services that have been indicated to be available by using the facilities of said first communication network.

6. The user equipment according to claim 4 or 5 comprising means for indicating the service availability status to the user of said user equipment.